

REMARKS

This paper is responsive to an Office Action dated March 17, 2004. Prior to this response claims 1-19 were pending. After amending claims 1, 4, 11, 14, and 16, claims 1-19 remain pending.

In Section 3 of the Office Action claims 11, 14, and 16 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Specifically, the Office Action states that there is no support in the specification for the limitation of "non-communicating" spacer channels. In response, claims 11, 14, and 16 have been amended to recite a "preformed pattern of spacers, with spacer channels between the spacers". Support for this amendment can be found in the specification on page 15, ln. 3-5.

In Section 5 of the Office Action claims 1, 3, 8, and 9 have been rejected under 35 U.S.C. 102(b) as being anticipated by Ge et al. ("Ge", US 5,892,558). The Office Action states that Ge discloses a rigid support substrate 34 made from glass or plastic, trenches 38/102 formed in substrate 34, a flexible substrate 22, and adhesive injected into the trenches. This rejection is traversed as follows.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Ge describes a transparent faceplate 22 (col. 2, ln. 19-20) and a transparent substrate 34 with defined grooves 38 (col. 4, ln. 38-41). The

groove 38 can be partially filled with adhesive 36 to secure a wire 11 (col. 6, ln. 48-50, see Figs. 5A-5C).

Claim 1 has been amended to more clearly recite the steps of filling trenches in a rigid substrate with adhesive, and attaching a flexible substrate to the rigid substrate, in response to curing the adhesive. Ge does not describe a step of using an adhesive-filled trench to attach adjoining substrates. Since Ge does not describe all the limitations of the invention of claim 11, he cannot anticipate. Claims 3, 8, and 9, dependent from claim 1 enjoy the same distinctions from the cited prior art, and the Applicant respectfully requests that the rejection be removed.

In Section 6 of the Office Action claims 1, 2, 5, and 6 have been rejected under 35 U.S.C. 102(b) as being anticipated by Matsushita et al. ("Matsushita", US 5,459,335). The Office Action states that Matsushita describes a rigid substrate 5 with trenches, and a process of filling the trenches with adhesive 4, to attach the rigid substrate to a flexible substrate. This rejection is traversed as follows.

Matsushita describes a process that forms an insulating oxide layer 2 overlying a Si substrate 2. A thin-film semiconductor circuit 1 is then formed on oxide layer 2. The thin-film circuit 1 is covered with an adhesive 4 and a support substrate 5 is attached to the adhesive-covered circuit layer 1 (col. 3, ln. 22-35). Matsushita does not describe a process of forming trenches and filling the trenches with adhesive. More particularly, Matsushita does not describe a step of forming trenches in rigid support substrate 5. In fact, the Office Action, on page 8, paragraph 1, acknowledges that Matsushita does not describe the step of forming a support substrate with trenches.

Since Matsushita does not describe the step of forming trenches in a rigid substrate, or filling rigid substrate trenches with adhesive, he does not describe all the limitations of the invention of claim 1. Claims 2, 5, and 6, dependent from claim 1 enjoy the same distinctions from the cited prior art, and the Applicant requests that the rejection be removed.

In Section 7 of the Office Action claims 1 and 9 have been rejected under 35 U.S.C. 102(b) as anticipated by Oku (US 5,621,550). The Office Action states that Oku describes a rigid substrate PL1 with trenches, a flexible substrate PL2 overlying the rigid substrate, and adhesive in the trenches to attach the rigid substrate to the flexible substrate. This rejection is traversed as follows.

Oku describes a thin plastic plate PL1 with saw-toothed grooves (col. 4, ln. 46-51) and thin plastic plate PL2 attached to PL1 using a resin TR1 (col. 5, ln. 7-13). Assuming that thin plastic plates PL1 and PL2 are rigid, Oku describes the bonding of 2 rigid substrates. Alternately, if the plates PL1 and PL2 are assumed to be flexible, then Oku describes the bonding of 2 flexible substrates. Either way, Oku does not describe a process of using an adhesive to attach a rigid substrate to a flexible substrate, as the claimed invention does in claim 1. Claim 9, dependent from claim 1 enjoys the same distinctions and the Applicant requests that the rejection be removed.

In Section 8 of the Office Action claims 11-12, 15, 16, and 18 have been rejected under 35 U.S.C. 102(b) as anticipated by Matsushita (US 5,459,335). The Office Action states that Matsushita describes a rigid substrate with a pattern of spacers 7, a flexible substrate 3 overlying the

spacers 7, attached using a cured adhesive formed in the spacer channels.

This rejection is traversed as follows.

In one embodiment Matsushita describes the use of plastic particles 7 that can be mixed in with the adhesive 4, to control the thickness of the adhesive. Specifically, Matsushita describes spreading the particle-filled adhesive on circuit layer 1 and, then, sticking the rigid substrate to the adhesive-covered circuit layer 1 (col. 4, ln. 44-55).

Matsushita does not describe the introduction a preformed pattern of spacers, with spacer channels between the spacers, overlying a rigid substrate, as the claimed invention does in claim 11. Therefore, Matsushita does not anticipate claim 11. Claims 12, 15, and 16, dependent from claim 11 enjoy the same distinctions, and the Applicant requests that the rejection be removed.

In Section 9 of the Office Action claims 11 and 19 have been rejected under 35 U.S.C. 102(e) as anticipated by Lovas et al. ("Lovas", US 6,290,793). The Office Action states that Lovas describes a rigid substrate 340, a pattern of spacers 320 overlying the rigid substrate, a flexible substrate 330 overlying the spacers, and adhesive in the spacer channels attaching the rigid substrate to the flexible substrate. This rejection is traversed as follows.

Lovas describes spacers that are disposed between substrates 330 and 340. Both the substrates 330 and 340 can be formed of materials such as Si, glass, plastic, dielectric, or metal. Frames 350 are placed on the outside surfaces of substrates 330 and 340. Pressure applied to frames 350 is transferred to the spacers 320, so that substrates 330 and 340 remain free of pressure (col. 4, ln. 45-62).

Assuming that substrates 330 and 340 are rigid, Lovas describes the bonding of 2 rigid substrates. Alternately, if the substrates 330 and 340 are assumed to be flexible, then Lovas describes the bonding of 2 flexible substrates. Either way, Lovas does not describe a process of attaching a rigid substrate to a flexible substrate. Even more critically, Lovas does not describe to use of an adhesive, or an adhesive that fills a spacer channel between spacers, as the claimed invention does in claim 11. Since Lovas does not describe the above-mentioned limitations recited in claim 11, Lovas cannot anticipate. Claim 19 enjoys the same distinctions and the Applicant requests that the rejection be removed.

Section 10 of the Office Action states that claims 11, 13, and 18 have been rejected under 35 U.S.C. 102(b) as anticipated by Tsubota et al. ("Tsubota", US 5,629,787). The Office Action states that Tsubota describes a rigid substrate 3/204, a pattern of spacers 5/208 overlying the rigid substrate, and a flexible substrate 2/206 attached to the rigid substrate, using adhesive injected into the spacer channels. This rejection is traversed as follows.

In example 3, Tsubota describes a resin scaling member 205 that includes glass fiber spacers particles, having a size of 5 microns, mixed into the resin (col. 14, ln. 13-23, see Figs. 22-24). Tsubota uses the sealing member 205 to bond upper substrate 204 to lower substrate 206. Tsubota does not mention the substrate materials in this embodiment, but mentions that substrates 204 and 206 are deflected (col. 13, ln. 48-53). Further, Fig. 22 shows substrates 204 and 26 as being flexible. In the embodiment of Figs. 4-7, Tsubota mentions that the substrates 2 and 3 may be glass (col. 7, ln. 15-24).

Tsubota, in one embodiment (Fig. 22), discloses flexible substrates. In another embodiment (Figs. 4-7), he discloses glass substrates. However, Tsubota does not describe a flexible substrate being attached to a rigid substrate in either embodiment. Neither does Tsubota describe the limitation of introducing a performed pattern of spacers. Rather, he describes spacer particles mixed in with a resin 205. Further, Tsubota does not describe spacer channels formed between spacers. The above-mentioned limitations are recited in the invention of claim 11. Since Tsubota does not describe all the limitations of claim 11, he cannot anticipate. Claims 13 and 18, dependent from claim 11, enjoy the same distinctions from the cited prior art and the Applicant requests that the rejections be removed.

In Section 12 of the Office Action claims 4, 7, 14, and 17 have been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Matsushita in view of Pai et al. ("Pai", US 6,612,888). The Office Action acknowledges that Matsushita does not specifically disclose the use of an N2 atmosphere, but that Pai does, and that it would have been obvious at the time of the invention to incorporate Pai's process of eliminating air bubbles, with Matsushita. This rejection is traversed as follows.

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, there are three requirements to establish a *prima facie* case of obviousness.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of

success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaack* 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

Generally, Matsushita describes an LCD invention that addresses the problem of removing a thin film circuit layer/oxide layer stack from a single-crystal Si substrate, for attachment to a support substrate (col. 1, ln. 53-61).

Generally, Pai is concerned with providing an improved commercial package that seals an electro-luminescence (EL) device from moisture and oxygen (col. 2, ln. 51-62). Pai describes a process of sealing an electro-luminescence device 502 between a glass substrate 500 and a glass plate 504. Initially, each EL device 502 is formed on glass substrate 500, partially surrounded by frame glue 508 and a spacer 510, and covered with glass plate 504 (col. 4, ln. 23-36). An opening 512 in the glue/spacer 508/510 permits a cavity 518 to be formed between glass layers 500/504. The glass substrate is cut, to separate the discrete luminescence devices from each other (col. 4, ln. 54-64). After pulling a vacuum, each package is inserted into a glue tub 522 and the cavity 518 is filled (col. 5, ln. 1-16).

With respect to the first *prima facie* requirement, there is no motivation to use Pai to modify the Matsushita reference in such a way as to make claimed invention obvious. Matsushita is attempting to solve the problem of detaching thin-film circuits from the substrates on which they fabricated, for attachment to a support substrate. Pai, on the other hand, is solving the problem of sealing an EL device. Since Matsushita does not address the issue of environmental sealing, there appears to be no

motivation for a skilled artisan to look to Pai to make modifications to Matsushita's substrate detachment/reattachment process. Alternately stated, Matsushita expresses no motivation to incorporate environmental sealing processes.

"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Without Matsushita's motivation to incorporate environmental sealing, it is improper to combine elements from the Matsushita and Pai references for the purpose of an obviousness analysis.

Further, the Office Action has not demonstrated that the modification of the cited the prior art references point to the reasonable expectation of success in the present invention, which is the second requirement of the obviousness analysis. Even if Pai could be combined with Matsushita, there is no expectation from the combination that a rigid substrate can be attached to a flexible substrate using adhesive-filled spacer channels, or adhesive-filled trenches in the rigid substrate.

With respect to the third requirement to support a *prima facie* case of obviousness, the combination of Pai with Matsushita does not describe all the limitations of the invention of claims 1 or 11. With respect to claim 1, neither reference discloses a trench formed in the rigid substrate, or adhesive injected into the trenches. With respect to claim 11, neither reference describes a flexible substrate that is formed overlying a pattern of spacers. Both of Pai's substrates are rigid. Matsushita describes an overlying rigid support substrate 5 being attached to an adhesive-covered circuit layer 1. The combination of

references neither suggests nor explicitly describes the inventions of claims 1 and 11. Claims 4 and 7, dependent from claim 1, and claims 14 and 17, dependent from claim 11, enjoy the same distinctions and the Applicant requests that the rejections be removed.

In Section 10 of the Office Action claim 10 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Matsushita in view of Matsui et al. ("Matsui", US 6,191,007). The Office Action acknowledges that Matsushita does not describe the step of forming a rigid substrate with trenches, but that Matsui shows trenches 821, and that it would be obvious at the time of the invention to incorporate the teachings of Matsui into Matsushita, to increase uniformity. This rejection is traversed as follows.

Generally, Matsui is concerned with the fabrication of silicon-on-insulator (SOI) MOSFETS (col. 5, ln. 52-60). More particularly, Matsui describes a process of forming a silicon thin-film on an SOI substrate. In one embodiment (Fig. 107) a substrate is formed including Si substrate 802, oxide layer 803, poly-Si layer 804/oxide layer 805 stack formed with a trench 808, and a monocrystalline Si layer 807 overlying oxide layer 805 (col. 97, ln. 27 through col. 98, ln. 39). The end result is improved film thickness uniformity. The trench is formed for the purpose of forming a buried electrode (col. 1, ln. 59 through col. 2, ln. 24).

There is no motivation to combine the Matsui and Matsushita references. They are working in two different fields of art; IC and LCD processing. More particularly, they are solving different problems. As mentioned above, Matsushita is addressing a detachment/reattachment problem to a support substrate. Matsui is improving the uniformity of an attached monocrystalline Si layer.

"It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). MPEP 2144.06

In this case, Matsui and Matsushita are useful for two different purposes. Therefore, it is not logical to combine the references. Further, the Office Action has combined the references in an effort to make obvious an invention that has a purpose different than either of the prior art references. Alternately stated, neither of the references addresses the problem of temporarily attaching a flexible substrate to a support substrate in a manner that makes it easily detachable in subsequent processes. Matsushita describes a permanent attachment to a support substrate, and Matsui describes the formation of a uniform Si layer.

With respect to the second *prima facie* obviousness requirement, even if the references could be combined, there is no suggestion in the combination of an invention that attaches a flexible substrate to a rigid substrate through the use of adhesive-filled spacer channels.

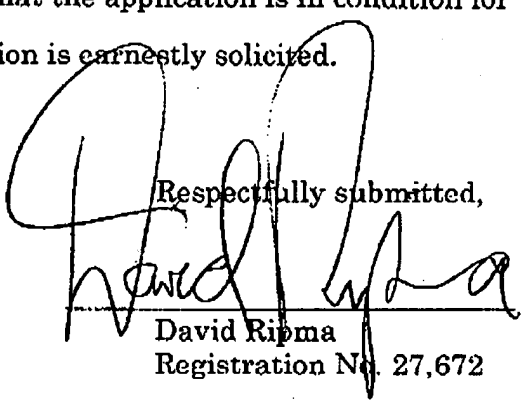
With respect to the third *prima facie* requirement, the combination of Matsushita and Matsui does not describe all the limitations of claim 1. Neither Matsui nor Matsushita disclose the limitations of forming a trench in a rigid substrate, filling the trench with adhesive, and using the adhesive to attach adjoining substrates. Claim 10, dependent from claim 1, enjoys the same distinctions from the cited

prior art. Since the combination of Matsushita and Matsui neither suggests nor explicitly describes the claimed invention, the Applicant respectfully requests that the rejection be removed.

It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

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Respectfully submitted,


David Ripma
Registration No. 27,672

David Ripma, Patent Counsel
Sharp Laboratories of America, Inc.
5750 NW Pacific Rim Blvd.
Camas, WA 98607
Telephone: (360) 834-8754
Facsimile: (360) 817-8505
dripma@sharplabs.com